High Throughput Data Program at Fermilab R&D

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Network Planning for ESnet/Internet2/OSG
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High Throughput Data Program (HTDP) at Fermilab

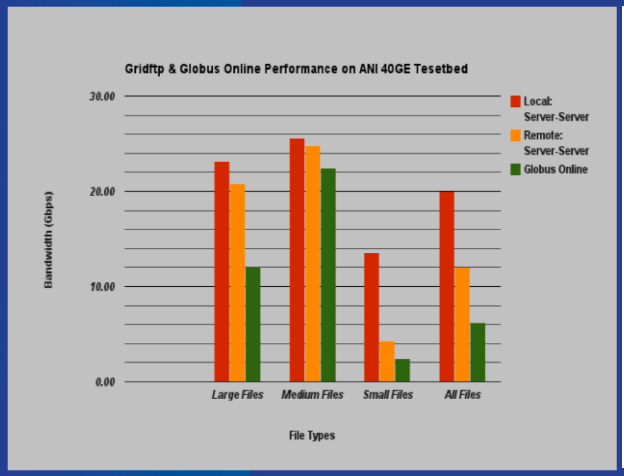
- **Mission**: investigate the impact of and provide solutions for the scientific computing challenges in Big Data for the the Computing Sector at Fermilab and its stakeholders.

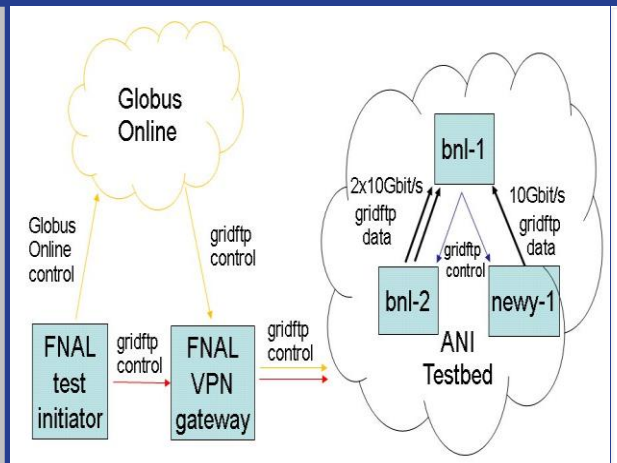
- Three major thrusts driving the project
  - Grid middleware evaluation on 100GE to prepare lab and its stakeholders for the transition
  - Foster the process to make network a manageable resource. Actively participate in OSG Networking activity
  - Integration of network intelligence with data and job management middleware

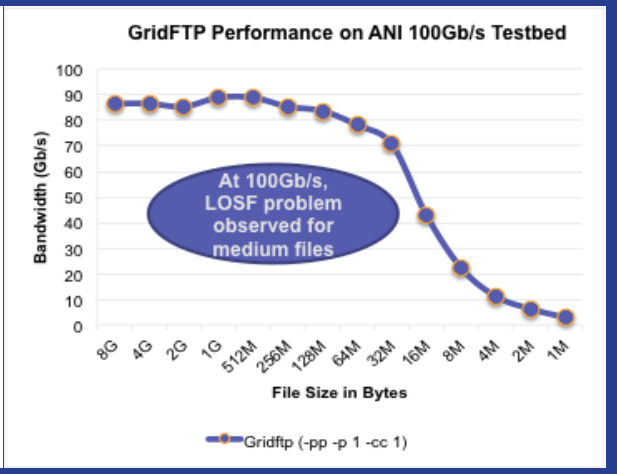
Grid Middleware evaluation on 100GE

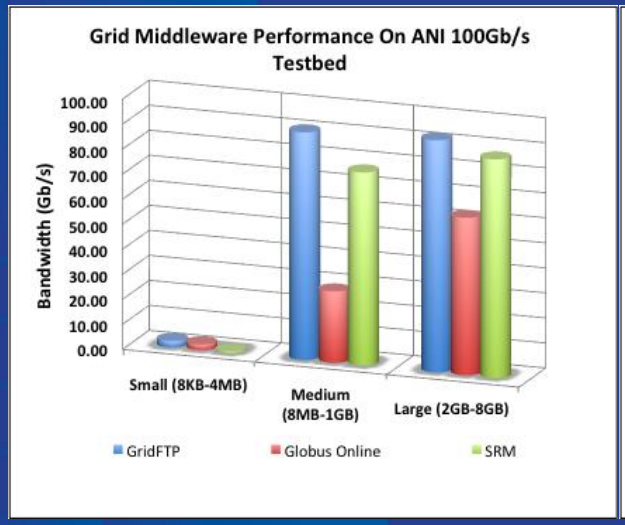
- 2011: ANI Long Island MAN (LIMAN) testbed.
  - Tested GridFTP and Globus Online for the data movement use cases of HEP over 3x10GE.
- 2011-2012: Super Computing 2011.
  - Demonstrated fast access to ~30TB of CMS data from NERSC to ANL using GridFTP.
  - Achieved 70 Gbps
- Currently: ANI 100GE testbed.
  - Evaluated xrootd, GridFTP, Globus Online, SRM, SQUID
    - Large files (2G-8G) perform well
    - Small (8K-4M) & medium (8M-1G) files suffer from LOSF
    - Medium is the new small
  - Evaluate other middleware based on stakeholder needs: CVMFS, IRODS, dcache, etc
- Fall 2012: 100GE Endpoint at Fermilab
  - Continue testing of middleware technologies defined by stakeholders. Subject to extension of availability of the ANI 100GE testbed

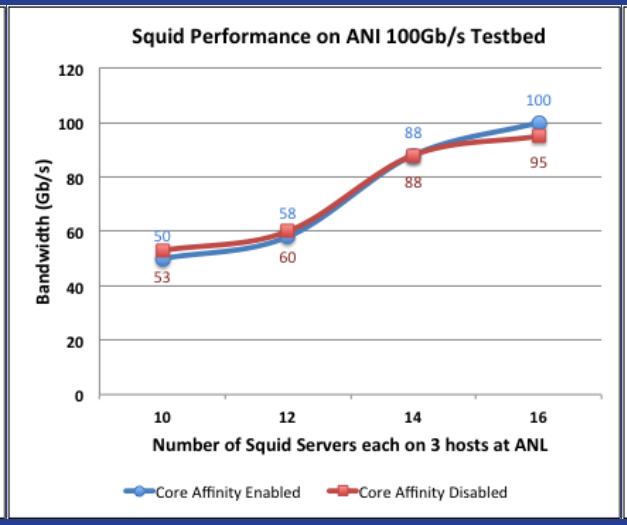
Experience on the ANI LIMAN & 100GE Testbed

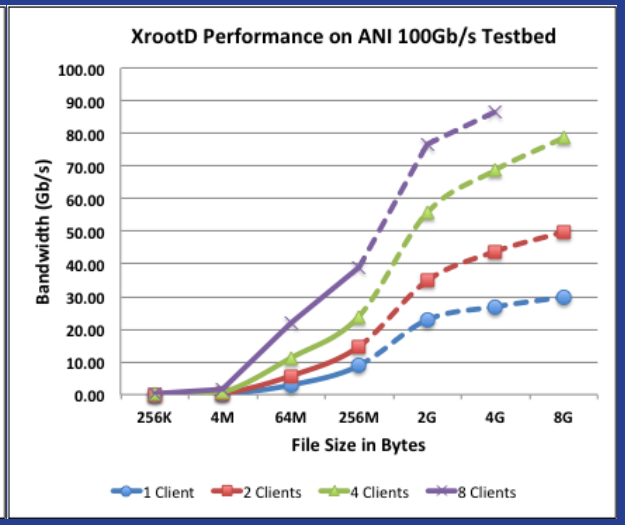












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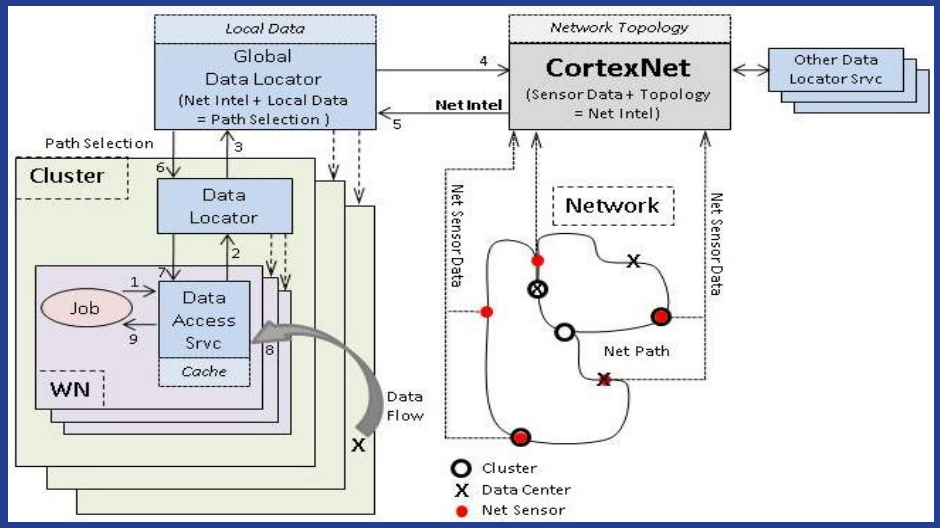
Collaboration with OSG

- Actively participate in the OSG networking area for Network-As-A-Service
  - The team brings to the table 10+ years of experience & expertise in Grid and Cloud middleware in the context of international collaborations (OSG, US CMS, XSEDE, …)
  - OSG Networking Dashboard, repository of network information
    - Secure Information gathering
    - Integration layer
    - Secure Presentation layer: Information consumption by human and middleware
  - We are very much interested in contributing to development of OSG Networking dashboard (internal stakeholder: USCMS)
    - Add gridftp network data to the repository.
    - Dashboard as source of information for network intelligence

Integration of network intelligence with data management service

- Feed network knowledge to the decisions on data and job placement (e.g. think of replica selection)
- Consumes information from the Dashboard
- Present information in a format that can be easily consumed by data management middleware
- Seeking collaborators to complement funding from external sources (targeting ASCR next)



Summary

- Program of work for HTDP
  - Continue evaluating middleware performance on 100GE
  - Actively participate in development of OSG Networking Dashboard
  - Integration of network intelligence with data management middleware